

Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20554

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(NOV 5 1993)

In the matter of

Amendment of Part 73 of the
Commission's Rules to Clarify
the Definition and Measurement
of Aural Modulation Limits in the
Broadcast Services

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MM93-225

FCC-MAIL ROOM

Comments of LARCAN-TTC INC.

These comments relate to the undesired modulation resulting from "sync spurs" - undesired spurious products that become part of the aural carrier modulation due to interaction between the visual and aural carriers in combined visual and aural amplifiers (sometimes called common mode amplifiers).

These products show up as frequency modulation of the aural carrier at 15.734kHz and harmonics thereof. The Commission has twice addressed the question of whether there is a provision in the rules governing the permissible amplitude of this unintended modulation¹. Further, several comments in response to Hammett & Edison's Request for Clarification (Release, dated November 30, 1990, DA90-1758) offer the opinion that these spurious products do not cause a problem in practice.

While common mode amplification has been the standard practice in translators and LPTV transmitter as long as such transmitters have existed, the increasing use of common mode amplifiers in high power transmitters has brought to the fore a measurement or operational problem. Normal methods of measuring peak deviation include the spurious 15.734kHz component and show a deviation that is the sum of spurious products plus the program material.

Our experience with common mode amplification going back even before the advent of stereo sound indicates there is no problem with this spurious modulation turning on the stereo feature in TV sets so equipped, unless a transmitter is grossly malfunctioning.

¹ Declaratory Ruling, Docket 21323, June 5, 1986, and Letter from FCC to Mr. Dane Ericksen, Ref. 1800D3, dated 9 September 1993.

Thus, any such products must be consistently below the 5kHz level of the 15.734kHz stereo pilot. In practice, a modulator monitor might show a residual deviation of 1 or 2 or, at most, 3kHz when the program audio is removed.

It should also be noted that the standard audio de-emphasis in TV receivers reduces a 15.734kHz audio frequency by more than the 12 to 17dB roll off at 15kHz (the upper limit of the de-emphasis curve), reducing the component before it reaches the audio circuits.

The purpose of establishing a maximum deviation limit is twofold: (1) To keep the audio level presented to the public constant from one station to another, and (2) to prevent spurious radiation which might cause interference.

Deviation Limit

The objective of providing a uniform audio level to the public is best served by excluding the 15.734kHz product (and harmonics thereof) from the measurement of audio deviation. Accordingly, we suggest a statement to the effect:

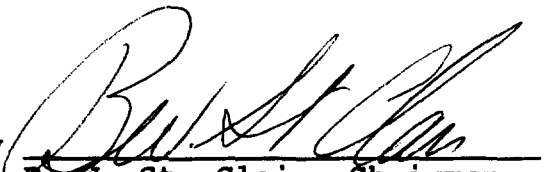
In the interest of providing constant amplitude sound to the public any spurious FM modulation at 15.734kHz and harmonics thereof will be excluded from the measurement of deviation in setting the aural deviation to be within the 25kHz limit of Paragraph 73.1570(3), for monaural operation or the 75kHz total modulation of Paragraph 73.682(c)(9) applicable to stereophonic plus multiplex subcarrier operation.

Out-of-Band Spurious

It is not the intention of these comments to suggest any relaxation of the existing out-of-band spurious requirements. While Paragraph 73.1590 sets a limit of -60dB at frequencies 3MHz above or below the band edge, there is interest in full adjacent channel protection both for cable operation and the coming ATV system. The spurious modulation is at 15.734kHz on a carrier 250kHz in from the upper band edge. Multiples up to 15 times 15.734kHz fall inside

the TV channel. The 16th order Bessel component of the FM modulation will be the first product to fall out of band². Products of this and higher orders will be difficult to even detect with normal test equipment. It is certain that the incidental 15.734kHz modulation, combined with the full 25 or 75kHz deviation allotted to desired signals, will not increase the hazard of interference in the adjacent channel.

Respectfully submitted:
LARCAN-TTC, INC.

by 
B. W. St. Clair, Chairman

² As a worse case, consider 3kHz deviation at 15.734kHz. The index of modulation, β , is $3/15.734 = 0.19$. Reference Data for Radio Engineers 7th Edition tabulates Bessel functions only up to the fourth order. For this order and $\beta=0.19$, the value is less than 0.0001 or -80dB. The value of the Bessel component decreases through the higher orders clearly placing a limit on any Bessel component outside the band at lower than 80dB below the aural carrier.